

Oral Presentations

Workshop 9. Integrating exercise

S19

WS9.1 Can lung function predict exercise capacity in patients with CF?

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Objectives: Despite considerable progress and improved survival in CF, patients still suffer from loss of lung function, malnutrition and reduced exercise capacity. Previous studies have revealed an association between oxygen uptake and lung function. The objective of this study was to examine whether a lung function measurement can predict oxygen uptake in children and adults with CF.

Methods: An analytical cross-sectional study based on registry data from 78 patients aged 9–42. The lung function was measured by spirometry, and oxygen uptake was estimated based on the Watt-max test.

Results: FEV₁ can predict VO₂max, with a prediction interval (PI) of 1.47 l/min ($R^2=0.65$), and FEV₁% can predict VO₂max/kg (PI=30 ml/kg/min; $R^2=0.22$). Furthermore, FEF_{25–75} can predict VO₂max (PI=2.06 l/min) and FEF_{25–75}% can predict VO₂max/kg (PI=32 ml/kg/min). All $p < 0.001$.

Stratified analysis showed that the association between FEV₁% and VO₂max/kg is comparatively stronger in patients with reduced lung function (FEV₁% <85; PI=24 ml/kg/min and $R^2=0.36$), than in patients with normal lung function (FEV₁% ≥85), where no association was found ($R^2=-0.02$), $p < 0.05$. Although significant, all PI's were too wide for any clinical relevance; for any FEV₁% predicted VO₂max/kg ranged from very low to very high for age and gender.

Conclusion: The model of predicting oxygen uptake solely based on lung function does not seem to be useful in clinical practice. The estimated prediction intervals are too wide caused by substantial individual variation in oxygen uptake, even in patients with reduced lung function. Exercise capacity can only be determined by testing it independently.

WS9.2 Modified shuttle test performance in CF children and adolescents with different severity of lung disease

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Background: Modified Shuttle Test (MST) validity was established in CF population. The maximal nature of this test has several applications; one may be serial testing in patients undergoing treatment changes. Yet there are neither accepted reference values nor indications to favour its wide utilization.

Aim: To determine the correlation between physical performance and clinical status in CF children and adolescents with different lung disease.

Methods: 134 CF patients (70 F) aged 6–18 years with a wide range of disease severity were recruited. Clinical status was evaluated by days of hospitalization (the year before enrollment) and spirometry. Exercise performance was assessed by MST. Data were stratified in 3 groups: severe (FEV₁ <60%), moderate (FEV₁ 60–80%) and mild (FEV₁ >80%) and analyzed statistically.

Results: MST performance (MSTP) was significantly superior in the mild group than in patients with moderate ($p=0.0034$) and severe ($p=0.0039$) lung disease. Within each group there was no significant correlation between MSTP and spirometric values. Days of hospitalization correlated significantly with MSTP in patients with moderate ($r=-0.32$, $p=0.019$) and mild ($r=-0.38$, $p=0.0036$) disease, but not in the severe group ($r=-0.28$, $p=0.13$).

Conclusion: Our data suggest that MST is related to clinical status in CF children with moderate/mild impairment, but has less value in severe patients. Further studies should be encouraged to assess its prognostic value and better establish its application in clinical settings.

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WS9.3 Reduced physical activity participation is associated with increased need for hospitalisation in adults with cystic fibrosis

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Objectives: Regular physical activity participation is associated with improved health for the general population. The impact of physical activity on health outcomes in adults with cystic fibrosis (CF) has not been assessed using objective measures. This study aimed to assess long-term relationships between physical activity participation and clinical outcomes in adults with CF.

Methods: Adults with CF in stable health, recruited prospectively, undertook physical activity monitoring over 7 days using the SenseWear Pro 3 armband (SWA), and completed exercise capacity assessment (Modified Shuttle Test), lung function testing, and a CF-related quality of life questionnaire (CFQR), at baseline and 12-months.

Results: Sixty-five adults with CF (34 male) with mean (SD) age 28 (8) years and FEV₁ 68 (20) %predicted were recruited. At baseline median daily moderate-vigorous physical activity (MVPA) time was 31mins [IQR: 15 to 53]. Twenty-one participants (7 female) accumulated 30mins MVPA in bouts ≥10 mins on at least one day. Those individuals who accumulated 30mins MVPA in bouts ≥10 mins had significantly greater FEV₁ (L) (baseline, $p=0.03$; 12-months, $p=0.02$); exercise capacity (baseline, $p=0.003$; 12-months, $p=0.006$), and significantly fewer hospital admissions ($p=0.04$) and total hospital days at 12-months ($p=0.04$). Significantly fewer females than males accrued 30mins habitual MVPA daily ($p=0.02$).

Conclusion: Daily accumulation of 30mins MVPA in bouts ≥10 mins was associated with better FEV₁, and fewer hospitalisations and total hospital days at 12-months. The number of participants, particularly females, who achieved 30mins MVPA in bouts of at least 10mins was low.

WS9.4 Exercise in hospital – Let's work it out

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Objectives: The exercise service offered to adult CF patients during hospital admissions was reviewed and data showed suboptimal frequency and intensity of exercise sessions. A service development plan (SDP) was formulated including: team education, additional equipment and the employment of an exercise practitioner. The aim was to re-evaluate the inpatient exercise service following the implementation of the SDP in early 2013.

Methods: An 8 week retrospective notes audit of inpatient exercise before and after implementation of the SDP was conducted. FirstBeat software was used to measure the training effect by analysing heart rate data and estimating EPOC (Excess Post-exercise Oxygen Consumption). The programme grades this 1–5 (minor to overreaching).

Results: Pre-SDP – 69 patients, median (range) age 26 (16–51)y, FEV₁ 1.22 (0.45–4.74)L, 37 (14–105) %predicted – completed 224 supervised exercise sessions in 8 weeks and <50% patients received SMART goals and formal documented discharge advice. FirstBeat data of 50 exercise sessions showed patients were reaching a training effect of 2.4 (maintaining effect). Following the implementation of the SDP – 65 patients, median (range) age 23.5 (16–68)y, FEV₁ 1.22 (0.44–3.44)L, 32 (13–78) %predicted – completed 338 exercise sessions over 8 weeks; 90% patients received SMART goals and formal documented discharge advice. The training effects of 50 exercise sessions significantly improved to 4.1 (improving effect), $p < 0.001$.

Conclusion: This SDP has resulted in improvements in the provision and quality of exercise sessions provided to hospitalised adults with CF.